# Address in Medicine

DELIVERED AT THE

SEVENTY-SIXTH ANNUAL MEETING OF THE BRITISH MEDICAL ASSOCIATION,

BY

JAMES KINGSTON FOWLER, M.A., M.D., HON. D.SC., F.R.C.P.,

DEAN OF THE FACULTY OF MEDICINE, UNIVERSITY OF LONDON; PRESIDENT OF THE MEDICAL SOCIETY OF LONDON; SENIOR PHYSICIAN TO THE MIDDLESEX HOSPITAL; CONSULTING PHYSICIAN TO KING EDWARD VII'S SANATORIUM AND TO QUEEN ALEXANDRA'S MILITARY HOSPITAL, AND TO THE HOSPITAL FOR CONSUMPTION AND DISEASES OF THE CHEST, BROMPTON.

## MODERN MEDICINE.

MR. PRESIDENT AND GENTLEMEN.—When I read the names of those who have been privileged to deliver the Address in Medicine at the annual meetings of this great Association I become the more sensible of the honour which the Council has conferred upon me but less confident of my ability to perform my allotted duty.

### THE ADVANCE OF MEDICINE.

In an address which I gave last year as President of the Medical Society of London on The Advances in Medicine during the Past Thirty Years, I endeavoured to remove the too prevalent misconception that whilst during that period great progress has been made in the department of surgery, medicine has been more or less standing still. That I was not wrong in assuming that such an idea was widely held amongst the laity, I concluded from numerous communications which subsequently reached me. From these I also learned that I had not been entirely unsuccessful in my attempt. Surgery, I contended, had but one victory to win; the triumph over sepsis laid at its feet vast territories where the knife was scarcely known, but in some of which the physician had hitherto held a feeble sway. Not so with medicine, which is required to attack separately problems of infinite difficulty presented by each disease and every organ of the body, and finds no single light which illumines every dark recess of its ignorance—an ignorance which it shares in common with all the other sciences, and which in our several spheres it is the duty of each one of us to attempt to remove.

I ventured to claim that, having regard to the wide field which it covers, the advance of medicine has during the last thirty years been infinitely greater in the mass than that of surgery, although, perhaps, not so readily appreciable by the public; and I expressed a confident belief that we need have no fear for the future, that it will far outstrip the past and that we are as yet but on the threshold of the knowledge which will reveal the methods of Nature in dealing with disease, not only in mankind, but also in the lower animals, in whose welfare we possibly take a more intelligent interest than many of their self-constituted protectors.

I propose to-day to review our position with regard to a few of the more urgent problems which confront us as they affect the art and science to which we are devoted,—the student, the practitioner, the physician, and the profession.

The past thirty years have been marked by an immense advance in our knowledge of the etiology and pathology of the infectious diseases, and it needs no great prescience to foretell that in the prevention and treatment of those affections we, or our successors, shall witness triumphs even greater than those which it has been our good fortune already to achieve.

### PASTEUR AND LISTER.

Amongst the many to whom those victories have been due the name of Pasteur stands pre-eminent. Those who have not read his life by Vallery-Radot have missed the most inspiring work of our time. What a record of simple faith, of patient labour, of scientific insight, and great achievement! As one reads of the opposition which he encountered, and which he was so frequently compelled to turn aside to meet, one grudges every moment of the time lost in strife with men who were unable to appreciate his greatness. But we need not waste our indignation upon his compatriots, for there were not a few in this country who were no less ungenerous to his great disciple, Lister, to whom mankind is so deeply indebted, and to whom now all are mindful of what they owe.

The seal has lately been placed upon the bond which unites two races under one flag on the Plains of Abraham; not far distant stands the single monument to Wolfe and Montcalm, leaders of opposing armies in life, but united in death.

Let us on this side of the Atlantic not be behindhand in setting up a memorial which will serve as a record to posterity of the friendship which, originating on the Throne of England. spread over two great nations and helped to preserve the peace of the world, let us hope, *in saecula saeculorum*. What memorial could Science and Medicine desire better than that Pasteur and Lister should stand in marble side by side in the entrance-hall of the University of London, of which Lord Lister is the greatest living graduate?

### VACCINE-THERAPY.

There is, perhaps, no subject which is exciting greater interest in our profession to-day than the treatment of bacterial infections by the inoculation of vaccines.

I had lately the pleasure to hand to Sir Almroth Wright the Fothergillian Gold Medal of the Medical Society of London, which is given triennially for scientific work in connexion with medicine or surgery published within a period of five years. It is fitting that a society of which Edward Jenner was a distinguished member should be the first to publicly recognize the value of the labours of one who has made the immortal discovery of Jenner the basis of his work. Whilst faddists and politicians have been, and still are, endeavouring to prevent the people of this country from rendering themselves immune to small-pox, vaccination has gradually acquired a wider and wider meaning, until now the principle underlying its action has become the basis of the most advanced medicine of to-day. Thus may Science ever confound her enemies!

The claims of vaccine-therapy to acceptance as a method of general application are receiving strict examination, and such they will continue to receive, and it should be welcomed, for of it nothing but good can come.

The minds of workers in science are, however, not always more free than those of humbler folk from a certain narrowness of view and an inability to appreciate the value of the work of others, and sometimes I fancy that I can see traces of this in the warfare that is now raging over the opsonic index and protective inoculation.

### THE PROCESS OF IMMUNIZATION.

The process followed by Nature in the cure of an infectious disease, and in conferring upon the individual immunity to it in the future stands now to some extent revealed.

The first stage in this march of Science ended with the proof that organisms are the cause of the infectious diseases. The second closed with the demonstration that by cultivating the bacteria under artificial conditions their pathogenic virulence can be greatly reduced, and that whilst an animal can be killed with a very small dose of the organism freshly isolated, a similar or larger dose of the attenuated virus will produce only a slight illness.

The third stage toward the desired goal was reached when it was shown that the animal thereafter was protected against repeated doses of the actively virulent culture of the organism, and that the artificial production of immunity had been attained. Up to this point there is no difference of opinion, but beyond it rival theories contend for mastery.

Are the leucocytes the sole active agents in the destruction of the infecting organisms? Is immunity brought about by phagocytosis, or are the bacteria first killed or their vitality seriously lowered by soluble constituents of the blood serum, the leucocytes acting either as scavengers or disposing of the bacteria already devitalized by the serum?

The weight of opinion appears to me to be overwhelming in favour of the view that agents other than the leucocytes play the more important part in this process. Some of these substances are present in the blood serum of a normal animal that has been submitted to no immunizing process; others appear in the blood as the result of infection, whether

occurring in the ordinary manner or induced in the process of artificial immunization by bacterial vaccination. The bacteriolysins are substances which dissolve micro-organisms; the agglutinins cause bacteria to swell up, to lose their motility, and finally to aggregate in clumps. The opsonins discovered by Sir Almroth Wright and Douglas are substances which do not kill the invading bacteria, but produce in them a chemical change of such a nature that they are rendered susceptible to the phagocytic power of the leucocytes. Whether these bodies are distinct from or identical with that which appears in the blood as the result of infection or immunization is a question which must be left for the decision of those who are specially engaged in bacteriological research.

### THE RESULTS OF VACCINE-THERAPY.

As to the great advance which the introduction of vaccine-therapy marks in the treatment of the infectious diseases, there can, I think, be little room for doubt. Sir Almroth Wright and his co-workers have established very clearly that in a variety of localized bacterial infections in which the staphylococci are the causative agents, for example general furunculosis, suppurating acne and sycosis, it is possible by the use of a standardized emulsion of the dead micro-organism either to cure or favourably influence the course of the disease.

Also that in many localized and chronic infections of streptococcal origin, especially when a vaccine derived from the patient's own particular strain of organism can be procured, a like favourable result may be obtained.

Where, however, this is not possible, and a so-called polyvalent market vaccine is employed, the result is frequently disappointing; an experience not limited to the use of stock vaccines of this kind only. A polyvalent antistreptococcal vaccine, it is to be remembered, is made by the use of *Streptococcus pyogenes* obtained from various sources, not from streptococci of known difference in reaction.

Moreover, in certain generalized streptococcal infections, both acute and chronic, the treatment by specific inoculation has given results which hold out promise of great possibilities in the near future. The majority of these latter affections occur in surgical practice with which we are not now so closely concerned, but in the treatment of the diseases of the heart we may ultimately possess an effective remedy for malignant endocarditis, which has, as its name implies, been regarded hitherto as a necessarily fatal malady.

Dr. Horder[1] has shown that in 28 consecutive cases of malignant endocarditis drawn from medical as distinguished from surgical sources, in which positive blood cultures were obtained, the infecting agents were as follows:

1. Streptococcus in 18 cases.
2. *Bacillus influenzae* in 5 cases.
3. Pneumococcus in 3 cases.
4. Gonococcus in 1 case.
5. Staphylococcus in 1 case.

In cases of malignant endocarditis arising in surgical practice, the common infecting agent is *Staphylococcus aureus*. Of the various types into which the streptococci are divided it is found that the majority conform to the type of *S. salivarius* and *S. faecalis*, which are comparatively non-virulent organisms. In cases of malignant endocarditis in which these are the causative agents, we may therefore hope to obtain the best results by the inoculation of specific vaccines.

The treatment of pneumonia and other pneumococcal infections by vaccines derived from the patients' own organisms has not so far been attended by any marked success; but the results of Continental and American observers warrant a serious investigation into the method, which should, I think, be carried on simultaneously in the general hospitals throughout the country. The day, if it arrives, when pneumonia can be successfully treated by a serum or a vaccine will indeed be memorable in the history of medicine, and to the man who introduced the method mankind will owe a debt of gratitude hardly less than they now owe to Jenner, Pasteur and Lister. Some of life's greatest tragedies centre round pneumonia, and we must all hope to live to witness the time when we can treat it with greater success than now attends our efforts.

A variety of local infections of the kidneys, the bladder, the colon and other organs in which the *Bacillus coli* is the infecting agent can now be successfully treated by the use of a bacterial vaccine, and it is satisfactory to learn that the method of protective inoculation against typhoid fever which Sir Almroth Wright introduced has been extensively used in the British army, the German army, and the Indian Civil Service, and that Lord Kitchener has expressed an opinion that all soldiers before proceeding to India should be submitted to this treatment.

Perhaps the greatest degree of interest attending the employment of a bacterial vaccine centres at the present moment around its use in pulmonary tuberculosis. That the new tuberculin is a remedy of value in the treatment of lupus, of tuberculous arthritis and of various other localized tuberculous affections has, I think, been abundantly proved. Before considering its use in pulmonary tuberculosis it will be necessary to discuss the question of the opsonic index and the theory of auto-inoculation.

### THE OPSONIC INDEX AND THE USE OF TUBERCULIN.

Sir Almroth Wright has, as you are aware, devised a method by which he claims that the amount of the protective substances present in any given specimen of blood can be more or less accurately measured. It is unnecessary to describe the technique employed to ascertain the opsonic content of the serum in any given disease; suffice it to state that the opsonic index is the result obtained by dividing the number of bacteria taken up per leucocyte in the presence of any given serum by the number taken up per leucocyte in the presence of the serum of a normal individual or of normal individuals, which latter is regarded as unity.

It is a self-evident fact that the possession of a test by which to regulate the dosage of a bacterial vaccine is, or would be, of the highest practical importance. We should know when the dose is too large, when it is too small and when it should be repeated. Had we any such test when in 1890 Koch published the results stated to follow the use of tuberculin in pulmonary tuberculosis? The effects of a prolonged and careful trial of tuberculin in such cases under the care of eight physicians at the Brompton Hospital were thus summarized:

1. That tuberculin, if introduced under the skin, speedily causes inflammatory changes in and around tuberculous lesions.
2. That the action of tuberculin in lung tuberculosis is to cause breaking down of the tuberculous masses and of the lung tissue in the neighbourhood, and thus to promote the formation of cavities. That this is the case is proved by the appearance of lung tissue in the sputum, where it was previously absent, and by the physical signs of cavity replacing those of consolidation.
3. That tuberculin increases the amount of expectoration, but that there is no proof that it diminishes the number of tubercle bacilli contained therein, for in some of the cases they apparently increased under its use.
4. That in many cases tuberculin injections are followed by a distinct extension of disease as evidenced by physical signs.
5. That the reactions due to tuberculin are exhausting to the patient and cause loss of weight and strength.
6. That this treatment is specially contra-indicated in lung tuberculosis accompanied by pyrexia, as likely to convert intermittent into continuous pyrexia.
7. That lung excavation accompanying the use of tuberculin may be followed by contractile changes due to fibrosis. This was shown in two of the cases under observation where diminution of cough and expectoration and gain of weight took place.
8. That the tuberculin did not favourably influence the course of the disease in the majority of cases, that in some the effects were detrimental and that even in the stationary and improved cases it was difficult to ascribe any distinct improvement to the injections which might not have been equally attained under the treatment ordinarily used in the hospital.

The new tuberculin is now being used at the Brompton Hospital and elsewhere, but I have not heard of any of the disastrous results above detailed following its employment. The doses, it is true, are infinitesimal compared with those given in 1890 and the following years. Then it was poisoning, now it is vaccination. But has not this change of dose

been mainly brought about by the observation of the opsonic index? Has not the successful treatment of the various affections which I have already enumerated been controlled by the opsonic technique? It is true that discordant results have been obtained when the estimations of the index were made from the same blood by different observers, some trained in Sir Almroth Wright's laboratory and others trained or untrained elsewhere, but the indices recorded by those who had received the same training showed very slight variations. This question has been recently very fully, and, as it appears to me, adequately dealt with in a paper by Mr. Alexander Fleming[2] on Some Observations on the Opsonic Index, with Special Reference to the Accuracy of the Method and to some of the Sources of Error.

### The Theory of Auto-inoculation.

Let us now consider briefly the theory of auto-inoculation, which also has been evolved from a study of the opsonic index.

The theory is that from a focus of infection within the body a process of auto-inoculation may be in operation, and that many of the phenomena indicating recurrent activity of the organism are best explained by assuming that at intervals the patient is spontaneously inoculating himself with a varying dose of the virus of his disease. This theory took its origin from the investigations of Freeman on the effect of massage on joints affected with gonococcal arthritis. He showed that any movements, passive or active, which are sufficient to affect a focus of infection result in a discharge of poison into the system, and that the discharge produces the same effect on the blood measured by variations in the opsonic index as an artificial inoculation.

"If the blood of a patient suffering from advancing pulmonary tuberculosis is examined from day to day as regards the opsonic index, it is found that in an absolutely irregular way, without apparent rhyme or reason, the index is constantly varying; negative and positive phase succeed each other at irregular intervals. We are dealing here with irregular inoculations of unmeasured poisons, and these doses of poison are coming from the focus of infection in the lung where the bacilli are multiplying—that is, they are the result of spontaneous auto-inoculation."[3]

In a case of pulmonary tuberculosis with a lesion which is neither arrested nor quiescent, exercise beyond a certain moderate degree almost invariably causes some amount of pyrexia, either temporary or permanent. The theory of auto-inoculation explains the fact which I have observed, that in nearly all the cases in which arrest obtained by sanatorium treatment has been followed by relapse, this has been due to over-exertion in sport or games and not to the effects of work. The importance of rest as the main factor in the treatment of the fever of the disease has long been appreciated. Have we not now an explanation of this and a proof of the accuracy of our clinical observations?

### Pyrexia in Pulmonary Tuberculosis.

Writing in 1893,[4] I called attention to the fact that by observation of the temperature in a case of pulmonary tuberculosis it is possible to determine the nature of the changes in progress in the lungs, and subsequent experience has confirmed the correctness of the views then expressed. The miliary, caseous, and fibroid varieties of the disease are characterized in each case by a definite and distinct range of temperature, and this is met with, not only in typical examples of those forms of the disease, but also when, as frequently happens, they appear as temporary complications during the course of a case of chronic pulmonary tuberculosis.

The conclusions to which I was led by a comparison of the temperature charts in fatal cases with the lesions found *post mortem* included the following:

1. The degree of fever in cases of pulmonary tuberculosis is a measure of the activity of the morbid process.
2. Marked pyrexia is always associated with an increase in the tuberculous lesions.
3. The pyrexia is most marked when the disease is making rapid progress in an organism still capable of reaction. The latter condition is essential, as in cases characterized by considerable failure of vital power continuous extension of the disease leading up to a fatal termination is not uncommonly observed in association with the absence of pyrexia.

In discussing the treatment of the pyrexia I stated,[5] "It is essential that the patient should remain completely at rest. This is the first and most important measure to be adopted, and without it all others are likely to prove of little effect."

Much has happened since, and our knowledge has been enlarged by the careful and continuous observation of many cases under treatment in sanatoriums.

If, however, the above conclusions are compared with the most recent statement of Sir Almroth Wright's views, it will be seen that there is not much that needs to be modified. He states[6] that, "while the temperature curve is a measure of intoxication and not of immunization, and while there is no direct and constant relation between the temperature curve and the production of antibacterial substances in the organism, we may take it that a diminution in the antibacterial potency of the blood generally leads to a multiplication of microbes in the system, this to increased intoxication, and this in its turn to a rise of temperature.

"In like manner we may take it that an increase in the antibacterial potency of the blood leads as a rule to a restriction of microbial growth in the organism, this to diminished intoxication and this in its turn to a reduction in the temperature. But while it is the rule to find this inverse relation of temperature to antibacterial potency, it is certainly not the invariable rule. It is notorious that excessive intoxication may condition a fall in temperature, and it is conceivable that a rise in temperature may sometimes be directly associated with efficient immunizing response."

### The Opsonic Index and Graduated Labour.

Whilst it is true that "the opsonic technique needs but simple laboratory instruments, and may be acquired by any one who will give the necessary time and application to it," it will not, I think, be denied that if and when in any given case or class of cases it is possible to avoid the necessity of determining the opsonic index of the blood at frequent intervals during a prolonged course of treatment, it is desirable to do so, if for no other reason than the saving of expense to the patient, who is probably from his illness debarred from earning his livelihood. The question is whether past experience and the observation of clinical symptoms can serve as adequate guides in the use of vaccines.

After an exhaustive consideration of the subject, Sir Almroth Wright concludes that, whilst we can in many cases rely upon these data, there are whole classes of cases in which they cannot be trusted to furnish the necessary guidance.

As regards the opsonic index in pulmonary tuberculosis, the question has lately been put to the test at the Frimley Sanatorium of the Brompton Hospital, where during the last three years a system of graduated labour, devised and introduced by Dr. M. S. Paterson, the medical superintendent, has been in operation.

For a complete description of the method, reference may be made to Dr. Paterson's paper read before the Medical Society of London.[7] The results have been successful beyond any which I have hitherto observed, and are due to the extreme care and judgement which have been exercised in suiting the amount and kind of work to the physical capacity of each individual patient. After this system had been in operation for two and a half years, during which period clinical observations, and especially the effect upon the temperature, were the sole guides employed in deciding upon the amount and kind of labour to be performed by each patient, the results were tested by the observation of the opsonic index by Dr. Inman, the bacteriologist to the Brompton Hospital. In carrying out this test, the most extreme precautions were taken to eliminate all sources of error depending upon what may be termed "unconscious bias." The examinations showed that 95 per cent. of the patients working in the various grades of labour, ranging from walking, carrying baskets loaded with varying weights of earth and digging, to working as navvies upon the construction of a reservoir, were found to have opsonic indices above the normal at some time during the day.

When this system of graduated labour was introduced as an adjunct to sanatorium treatment, it was not realized that the patients, in addition to the benefits to be expected

from the increased functional activity of all the organs and tissues of the body which such labour induces, were at the same time being treated with doses of tuberculin of their own manufacture. Yet, if we accept the theory of auto-infection, no other explanation appears to me so completely in accord with the observed facts; we were in the position of M. Jourdain, who discovered that for ten years he had been writing prose without knowing it. During the month in which these tests were carried out Dr. Inman was only able to discover 2 cases in which the amount of work done had exceeded the limits of prudence; in both the slight fever, headache, and loss of appetite induced were accompanied by a negative phase in the opsonic index, which lasted quite a short time, and did no appreciable harm. These facts appear to indicate very clearly that in afebrile cases of pulmonary tuberculosis, when the treatment is supervised with the exact knowledge of the capacity of each individual obtained by Dr. Paterson at Frimley, clinical observation may be trusted, and the continuous control of the opsonic technique is unnecessary. Nevertheless, even in such cases questions as to the true interpretation of certain symptoms do from time to time arise, and resort is necessary to the opsonic index, from which an immediate answer may be obtained, whereas it might take a month or more to arrive at a decision from observation of the clinical condition alone.

As the result of the labour of these patients there is now to be seen at Frimley a reservoir 108 ft. long, 58 ft. wide, and 13½ ft. deep, capable of holding half a million gallons of water. Its construction necessitated the excavation and removal to a variable distance in baskets or barrows of 4,175 tons of earth. Nearly 1,000 tons of concrete were required for the walls, the whole of which was made and placed in position by the patients. Much other labour of a less striking kind has also been performed. Of the 344 patients who during two and a half years were engaged in this work, 253 are earning their living, 9 are not at work, 8 are dead, and 74 have failed to report.

The appearance of a large number of the old patients who were present at the sanatorium on July 4th of this year was extremely satisfactory, and that of the men then actually engaged in the hardest labour was, if possible, even more so.

Any one who will take the trouble to go to Frimley will agree that the best prescription in afebrile cases of pulmonary tuberculosis is "graduated labour."

No one who has watched the change in the physical condition which in the course of six months or less occurs in these patients when daily engaged in graduated labour, a change so great that at the end of their treatment they look more like navvies than consumptives, can imagine that a like effect can ever be produced by the administration of any drug. Such individuals, it must be remembered, were often weaklings before they were consumptives, and if we merely arrest their disease, weaklings they will remain.

### Sanatorium Treatment and the Use of Tuberculin.

When in 1899 I opened the discussion on the sanatorium or open-air treatment of pulmonary tuberculosis at the Royal Medico-Chirurgical Society, it required some courage to advocate what many thought to be only one more addition to the long list of remedies which they could recall which had enjoyed a short vogue and then disappeared to the limbo of the forgotten. The buckets of cold water thrown over it during the discussion would have certainly drowned an infant of less vitality. Those who have taken part in the introduction of the sanatorium system of treatment into this country can, I think, now look back with satisfaction to their share in a work which has most certainly effected great good to individuals and has had far-reaching effects upon the health and habits of the people. It may even have suggested the introduction of the Daylight Saving Bill, a measure which has already obtained the approval of many men eminent in science, and which should, I think, receive the support of a profession to whose care is entrusted the physical welfare of the people. The badge of the movement should be the rising sun, and beneath it,

"As thy days so shall thy strength be."

But are we about to witness the disappearance of the sanatorium? I think not. On the contrary, I look forward to a more general use of sanatoriums for a variety of affections other than tuberculosis. As the advantages of an open-air life combined with careful medical supervision become better known, the sea voyage which so often means life in a windy passage on deck and a stuffy cabin below, and the hotel at a health resort on the Continent, where influenza perhaps is rife, will be replaced by sanatoriums in convalescence from acute disease and in many cases which require the constant medical direction which has in this country hitherto been so difficult to obtain, although on the Continent the necessity for it is generally recognised.

Have we in the new tuberculin a remedy of value in the treatment of pulmonary tuberculosis? Its good effects in localized tuberculosis have been proved by many observers. Convinced, as one was long before 1890, that any remedy which caused a rise of temperature must be harmful when the disease affects the lungs, one had no hesitation, after a comparatively brief experience, in condemning it in the form and in the doses then considered necessary. But I am now more hopeful. The temperature charts of some cases which have been under the care of my colleague, Dr. Latham, appear to me to show that it is possible, by the administration of minute but gradually increasing doses of the new tuberculin by the mouth, in combination with serum or saline solution, to produce an effect upon the temperature in pulmonary tuberculosis. If with increased experience this should prove to be so, we may, I think, confidently believe that it must be attended by a lessened activity of the disease.

There are cases, for example, in which sanatorium treatment appears temporarily to stop the process of auto-inoculation, but fails to develop the resisting power sufficiently to enable the patient to take exercise without inducing a recurrence of pyrexia. In some cases of this nature it has been observed that the administration of tuberculin may effect the desired result. So long as auto-inoculation continues or recurs there is no real arrest of the process. But much labour is still necessary, and the working out of this problem must be left to those who have had a prolonged experience of the affection and have special opportunities of observing the effects of the remedy.

My belief and hope is that sanatorium treatment and vaccine-therapy will prove of mutual assistance in our warfare against a disease which is now in retreat, and over which those who come after us may obtain a complete victory.

It is to be hoped that there will never be a repetition of the lamentable lack of judgement, of self-control, and of those critical faculties which should characterize the members of a scientific profession which were displayed in 1890 and the following years. If to-morrow we were in possession of an absolutely certain remedy for pulmonary tuberculosis it is probable that nearly two-thirds of the existing cases would be beyond the hope of cure. There is no drug known which is not limited in its effects by conditions of the body and the extent of the disease, which latter in cases of pulmonary tuberculosis is generally about three times greater than the physical signs indicate. Ought not these facts to give pause to those irresponsible directors of the lay press who are careless of the hopes they excite or the grief which they cause, so long as they obtain sensational copy which will increase the sale of their papers?

I lately saw a very robust-looking officer just arrived from abroad who had been placed in a rather curious predicament by a too blind belief on the part of a military surgeon in the infallibility of Calmette's test for tuberculosis. The officer contemplating marriage, and having some fear that he might be tuberculous, consented to be tested. He was assured that if the reaction did not occur before the afternoon of a certain day he would be proved to be free from any taint. That evening he went to a dance, and, confident of his soundness, on meeting the object of his affections he proposed and was accepted. But alas! on the following morning the eye gave a positive result. Torn with conflicting emotions, he determined to come home at once and seek advice; but before he left his anxiety was somewhat diminished and his confidence in his medical friend a little shaken on learning that the whole of the rest of the polo team had reacted to the test.

There are many other problems in the medicine of to-day which I should like to have discussed, but I must pass on to fulfil the promise with which I set out.

### THE STUDENT OF THE FUTURE AND THE UNIVERSITIES.

What of the student of the future? I think we may confidently conclude that he will in larger and ever-increasing numbers resort to the universities for the preliminary and intermediate subjects of his education, and that the medical schools will become, as in my opinion they should be, clinical schools, limiting their sphere to the teaching of those subjects of the curriculum which must necessarily be studied in connexion with a hospital.

These subjects are undergoing, and will continue to undergo, such an enormous expansion that the schools, even when they restrict their energies to the task, will find it year by year more difficult to teach the whole of them satisfactorily.

Medical education is a form of technical education in the efficiency of which the public, if they only realized it, are interested as much if not more than in many others to which public money is given, inadequately it is true, but without hesitation.

In the future endowment and the financial support of public bodies will only be given to the universities, and nothing can be more shortsighted than to exclude our students from the benefits enjoyed by those in other faculties.

A temporary majority of the teachers in the London schools, in the exercise of their wisdom—or shall I say folly?—have recently decided that this shall be done, and I have just been engaged in ascertaining my personal liability in connexion with the proposed return to the generous donors or to their representatives of a sum of £70,000 subscribed to a scheme for the building and endowment of an Institute of Medical Sciences to be under the control of the University of London.

This sum might easily have been doubled or trebled if the Senate of the University and the teachers in the schools had given a whole-hearted support to the scheme. When a body responsible for the issue of such an appeal allows obstruction to thwart it at every step, and when it has to fight for its life at every meeting of the committee ostensibly formed to carry it to a successful issue, it is not astonishing if it terminates in disaster. Great ends are not achieved by such means. *Delenda est Carthago.* Let us hope that through the fire of a Royal Commission it may pass to renewed life and nobler aims. In this and other cities you possess the priceless spirit of local patriotism, which, when questions of great moment are to be decided, insists that the minor interests of individuals and institutions shall be subordinated to the common good.

Speaking as I feel sure I may in the name of this Association, I congratulate the city of Sheffield on the establishment of the University, and wish it all possible success. For myself I would say that I do not share the fears which some express at the recent increase in the number of universities in this country, for, on the contrary, I believe it to be an unmixed good.

When this Association met in Sheffield in 1876 the Address in Medicine was given by Sir Edward Sieveking, and much of it was devoted to the question of the relation of the profession to the universities. "To my apprehension," he said, "a university does not deserve the name which does not within itself teach the principles and theory of all science and which adopts a régime and habits that exclude from its precincts all whose mental calibre cannot adapt itself to one formula of a classical or mathematical shibboleth or whose means compel them to enter a professional calling without unnecessary delay. I maintain that all members of learned professions ought to enjoy a university training, and that a country whose universities do not allow of its students acquiring the entire theoretic part of their respective professions within their walls neglects the first duty for which they were called into existence. I will not now speak of any other profession than our own; but as regards medicine I conceive that many of the educational difficulties that have been so long under discussion and that are far from being removed will disappear when such arrangements are made at our universities that the great body of practitioners can avail themselves of their advantages." Wise words from no narrow mind. "Long under discussion and far from being removed" thirty-two years ago! Still under discussion and "far from being removed" in London to-day! How slowly an institution may move when it is dominated by the Progressive party!

### THE PRACTITIONER OF THE FUTURE.

In time the student becomes a practitioner. What advice shall we offer him at the outset of his career? To maintain the high traditions of unselfish devotion to duty which have characterized the profession in the past; to be guided in all the difficulties which he will meet by the simple rule to act as a gentleman; to cultivate a cheerful and hopeful disposition, and to keep an open mind. In the latter lies the secret of perpetual youth. Sir Andrew Clark, whom to know well was to love much, was fond of saying that "No man is old until he ceases to be able to adapt himself to his environment. When I go into the country," he said, "and meet a practitioner who talks about those damned microbes, I know he is old. It does not matter what his age may be." But how will the practitioner fare for a livelihood in the future if the ever-increasing tendency of the people to expect gratuitous medical attendance continues unchecked, and neither political party considers it to be its duty to encourage habits of thrift amongst the working population?

I observe from a publication recently received that 119,382 in-patients were treated in the medical charities of London during the year 1907, and that no less than 6,019,203 out-patient attendances were recorded. Exactly how many individuals were concerned in producing this enormous total it is difficult to state, but it is estimated at about two and a half millions. It would be interesting to know how many persons received gratuitous legal advice in London last year. For thirty years, to my knowledge, the abuse of hospitals has been a burning question, and many earnest men have given time and thought to its consideration; yet nothing of any moment has been done. Year by year the numbers continue to grow, and we learn that last year 183,800 more were treated than in the previous year. I believe this state of things is not confined to London, and I may be told, as I have been before, that inquiries show that there is no evidence of abuse. If the figures do not speak for themselves then the evidence has not been sought for where it would be found—namely, amongst those engaged in hospital and general medical practice. This abuse of the generosity of the profession will, in my belief, continue and increase so long as it is to the interest of the managers of hospitals to show that they are doing what it is the fashion to call "a great work."

Having enjoyed a somewhat extended and varied experience of hospital committees, I have learnt to admire the devotion of their members to a self-imposed duty of ever-increasing difficulty, but this does not dispose me to blindly trust to their wisdom. The moment that the relief of mere numbers ceases to be a merit and it becomes to their interest to show that they have done everything possible to ensure that those who receive gratuitous medical treatment are really deserving of it, a great falling off in the attendances will immediately occur. Then, and not until then, it may be possible to establish provident dispensaries, which shall, as is the case at Northampton, include the great bulk of the labouring population permanently dwelling in a given area. The only body which can bring such an influence to bear upon the managers of the hospitals of London is one which has the power of the purse, and such an one now exists in the governing body of King Edward's Hospital Fund, to whose earnest consideration I commend the question.

### THE PHYSICIAN OF THE FUTURE.

Let us now pass on to consider the physician of the future.

Sir Almroth Wright is of opinion that he will be an immunizator. We shall all agree in hoping that it may be in his power to afford immunity to his patients from as many diseases as possible, and we shall also agree that as a student and subsequently he must have received a careful and prolonged laboratory training. But I submit that he must continue to be in the future, as he has been in the past, above all things a man of wide clinical experience. No matter how great the advance of science may be in the future, there will never be a royal road to medicine; it will be the common road that all must tread who aspire to treat disease, and, after the class-room has been left behind, it will lie through the wards of the hospital, the *post-mortem* room and the clinical laboratory, and will always lead back to the bedside. The physician

of the future will have to deal with human nature as we have had to deal with it. Times may change, ideals may alter, but water and human nature will ever remain weak. They are the only two things in this world on which it is safe to stake one's last shilling. It used to be thought that there was a third—namely, beer—but recent events have shattered that opinion.

In the future, as in the past, the first and most important thing will be the diagnosis of the patient's malady. Once that has been accurately determined, the rest is comparatively easy. I lose no opportunity of impressing on students that the one thing that cannot be read up is "diagnosis"; that must be learned at the bedside. Some may think that as medicine becomes more and more firmly fixed upon a sure basis of science the diagnosis of disease will gradually prove an easier task. It will become more certain in competent hands, but it will never be easy, for, as science grows it will continually place new burdens upon the physician and the practitioner. I have had many opportunities of observing that the recent increase in the number of laboratory tests available is surely leading to the disuse of the older methods of investigation—the employment, that is, of all the senses with which Nature has provided us; and it is a physiological law that atrophy follows disuse.

It must have occurred to every physician to be called to a case in which the condition of the blood and of every secretion that lends itself to examination had been carefully investigated, not once only, but several times, and yet the diagnosis was as far, if not further, off than ever; whereas, an intelligent use of the old-fashioned methods of inspection, palpation, percussion, and auscultation, showed that it was literally staring one in the face.

In so saying, I shall not, I trust, be thought to undervalue the very great assistance given to diagnosis by the newer methods. I am only urging that the older should not be allowed to fall into disuse.

The bacteriologist, in some at least of the general hospitals, is now regarded as the servant of the physician, who orders that certain investigations shall be undertaken. This is not, I submit, the position to which he is entitled. In important cases in which his advice and assistance are required, he should consult on equal terms with the physician at the bedside, and the investigations to be made or the treatment to be adopted should be the joint result of their deliberations. If they differ, the view of the senior partner should prevail. The future will determine for itself whether, or to what extent, these two individuals should be united, but it is clear that in the transition period to which we belong they must act together, as each is the necessary complement of the other. That any person professing ignorance of clinical medicine should independently attempt to treat disease is a position so unsound that it needs but to be stated to be condemned.

It will, I think, prove to the advantage of the consulting physician that his rôle of practice should in the future be more clearly defined, and that some recognized means should be provided whereby he may be able, if he so desires, at some period of his career to let it be known that he has ceased to undertake regular medical attendance. It may be so now in theory, but if so the theory and practice differ.

The position would be analogous to that of a junior barrister who desires to be a leader. The public, reading that Mr. Smith has been appointed one of His Majesty's counsel, possibly imagines that the King, having observed the skill shown by Mr. Smith in the conduct of his cases, has determined to secure his services. The fact is that Mr. Smith, from a confidence in his own powers—a confidence which the future sometimes shows to have been misplaced—or from a fear that a competitor may supplant him, applies to the Lord Chancellor to be given a silk gown, a request which that high official at his discretion either grants or refuses.

Sidney Smith was once asked by an anxious mother what profession he recommended for her son. He replied, "Madam, I should bring him up to be a bishop; I have observed that it is a very respectable calling." But one must begin as a curate.

I refrain from suggesting the exact means by which in our profession this change of status should be brought about, but I am not advocating a measure which I have not myself adopted for many years, or one which there is any serious difficulty in carrying into effect. The claims of humanity and friendship will, of course, always remain paramount. I believe that by the adoption of this step the consultants would attain a higher position in the estimation of the public, and that the general practitioner would thereby obtain an assurance which he now lacks that he will not be supplanted in the confidence of his client.

There is yet another change which I think the physician may do well to consider. I can recall the time when in the pelvic region pathological and clinical darkness reigned supreme. Into this I was privileged in 1884 to throw a ray of light by a Contribution to the Pathology of Hydrosalpinx and Pyosalpinx. Since then light has come from many quarters, and to-day the affections which originate there are accurately diagnosed and successfully treated by a medico-chirurgical person who is not thereby excluded from the Fellowship of the Royal College of Physicians. May not the physician whose department of practice lies in other regions follow this example with advantage to himself and also to the public, for whom the profession exists and to whose interest it is that two persons should not be required for work which can be adequately done by a single individual? To give a concrete example, I can see no reason why the physician who is competent to diagnose the existence of an empyema and to locate its position should be debarred from employing the only means by which it can be successfully treated. It is, to my mind, quite certain that if the younger physicians do not boldly make this departure from old traditions they will find themselves year by year more and more displaced in the practice of their profession.

### The Medical Profession.

We are frequently reminded that ours is a noble profession, and so it is, and one which gives a continuous interest to life and to which it is a source of pride and honour to belong; but I have observed that this reminder often precedes an attempt to place upon our shoulders, already overburdened with unpaid labour, some further duty similarly recompensed. To this there is a limit, which has long since been reached, if not overstepped. The public is apt to take a profession, like an individual, at its own valuation, and it may be to our advantage in the future to let it be known that we regard our services as worthy of their due reward.

Many of my friends have lately received the offer of commissions *à la suite* in the Territorial Army, and I hope that they have accepted the honorary office, for I conceive that it is our duty as a profession and as individuals to give to the Territorial Army our most hearty support, so long as it holds the field—even if it is the only field it ever holds.

Perhaps some of them in their reply may have taken the opportunity to point out the great advantage which would accrue to the nation if the whole of its youth was compelled to submit for a brief period to a course of physical training, which would strengthen their bodies and discipline their minds, and convert the slouching youths of public schools and country lanes into well-set-up young men capable of defending their country in time of need.

In the days of our forefathers, when the bow and arrow was the national weapon, this duty was recognized, for in the archives of the city of Winchester—the cradle of the English race—it is recorded that men were fined when they had "not frequented archerie, nor used to shoot on long bowes by the space of one month, contrary to the statute thereupon made." To be compelled to fit one's self to defend one's country was not then accounted to be "un-English."

History may prove that a people that refuses to accept the obligation of military service thereby shows itself unworthy to hold a high position amongst the nations of the world.

I stated at the outset that I had no fear for the future of medicine. I will close with the expression of an equally confident belief that in the times to come those who practise it will be held in increasing honour, and that of him who is faithful to its high traditions it will be true, as long ago it was of him who sought wisdom, that

"Many shall commend his understanding."

"His memorial shall not depart and his name shall live from generation to generation."

"If he continue he shall leave a greater name than a thousand; and if he die, he addeth thereto."

REFERENCES.

[1] *Practitioner*, vol. lxxx, No. 5, p. 714. [2] Ibid., vol. lxxx, No. 5, p. 607. Inman, The Value of the Opsonic Index in Pulmonary Tuberculosis, ibid., vol. lxxx, No. 5, p. 661. [4] Ibid., vol. li, No. 4. [5] Fowler and Godlee, *The Diseases of the Lungs*, p. 404. [6] *Practitioner*, vol. lxxx, No. 5, p. 580. [7] *Lancet*, January 25th, 1908.

# Address in Surgery

DELIVERED AT THE

## SEVENTY-SIXTH ANNUAL MEETING OF THE BRITISH MEDICAL ASSOCIATION,

BY

**R. J. PYE-SMITH, CH.M.SHEFFIELD, F.R.C.S.,**

CONSULTING SURGEON TO THE SHEFFIELD ROYAL HOSPITAL; PROFESSOR OF SURGERY IN THE UNIVERSITY OF SHEFFIELD.

## PROPHYLAXIS IN SURGERY.

MR. PRESIDENT AND COLLEAGUES,—My first and pleasant duty is to return my sincere thanks for the honour of being placed in the position I occupy at this hour. I owe it, I gratefully acknowledge, to the generous good feeling of my local colleagues and to the privilege of seniority; but I accept it as a compliment to this city, and a recognition of the position occupied by provincial surgery.

### LORD LISTER AND ASEPSIS.

Looking back over the forty years since I entered as a student at Guy's Hospital, great indeed have been the changes and developments in the practice of surgery that it has been my happy lot to witness. But all other advances are overshadowed by the epoch-making work of Lord Lister, who at that time was beginning to throw the searchlight of his genius on to the subject of sepsis, and has long since emancipated operative surgery from the clutches of infective complications. He found a truly terrible mortality attending compound fractures and operative wounds. He saw the death-rate fall, as if by magic, when he had traced it to its source and had controlled its cause. He found our large hospitals hotbeds for gangrene, suppuration and pyaemia. He has seen those dire accompaniments of wounds successfully banished and hospitals made the safest of all places for operations, since the principles he enunciated have been universally adopted. He found surgeons and patients alike dreading almost any operative procedure, on account of the attendant dangers of sepsis, and regarding it as a last resort. He now sees them both often welcoming operation at the earliest possible stage, as the surest and safest means of treatment. He found the abdomen, the large joints and all other serous cavities closed to hopeful surgery on the same account. He has lived to prove them as safe as any part of the body and a prolific field for successful operative treatment. He found surgeons desperate or despondent from continual disappointment, in spite of their great manual dexterity. He lives to see them calm and confident with the hopefulness that comes from the experience of safety. Truly a record such as this places the name of Lister among those

> Whose thoughts, like bars of sunshine in shut rooms—
> 'Mid gloom, all glory—win the world to light.

The development and application of antiseptic principles have indeed been the dominant influences at work these forty years in the advance of surgery, and the victory of operative asepsis is now within the reach of every careful surgeon. And in that fact is seen the great practical value of the patient investigations and bold generalizations of Lord Lister. He has brought the life-saving influences of his work within the reach of the humblest surgeon and the poorest patient. And, as an advancing army effects less by the distance that its vanguard has penetrated into the enemy's country than by the subsequent marching up of the rank and file, so the greatest discoveries in surgery can be of but little utility to the race without the co-operation of those who are practising the art. Thus it is largely upon us who are in the ranks that the duty devolves to utilize the new knowledge that our leaders have gained and to carry into our daily work and into the homes of our patients the illuminating results of their pioneer work.

### PROPHYLAXIS IN SURGERY.

Vast, indeed, are the fields opened up by the antiseptic method, wherein operative surgery is now reaping its harvests in late as well as in early stages of disease; but it is in prophylaxis that the results of antiseptic precautions are chiefly seen and are of such far-reaching importance. The prevention of the bacterial infection of operative wounds (operative asepsis) is the glory of antiseptic surgery. But when sepsis is already present, or where the potentially-infective mucous membrane of the alimentary canal is involved in the operative area, we must trust in a greater degree to the natural resistance of the tissues, and supplement this not only by an aseptic operative technique, but also by all the means at our disposal for the specific immunization of the body. Such materials as nuclein (for inducing hyperleucocytosis), serum, normal and variously modified (for supplying antimicrobic, antitoxic, and various other chemical substances), and bacterial cultures, dead or living (for stimulating the manufacture of such substances in the blood), are on their trial. And may we not hope, thanks to the laborious work of Sir Almroth Wright and others, that we are on the eve of such discoveries in the practical use of vaccines as shall bring both acute and chronic infections under control, and place in our hands another weapon wherewith to prevent the late and often fatal stages of both local and general infection?

Prophylaxis is, it seems to me, as real and valuable in surgery as it is in medicine or obstetrics or even in sanitary science—a thesis ably maintained from this chair twelve years ago by Dr. Roderick Maclaren,[1] and well worthy of our renewed consideration to-day. The preventive achievements of sanitation are indeed among the most conspicuous of the flowers of civilization of which our profession is justly proud. They form a first line of defence which guards us from the overwhelming attack of such foes to health as plague, leprosy, cholera, malaria, yellow fever and Malta fever, some of which have decimated our population or disabled our army in past centuries, some almost till now. Medicine, which by checking functional derangement is constantly preventing organic disease, has long devoted direct attention to the prophylactic aspect of her work, and, as our second line of defence, has obtained signal victories with regard to small-pox, diphtheria, hydrophobia, and other diseases; whilst obstetrics can scarcely have been practised without some regard being had to the prevention of mishaps and complications to mother and child. But when the enemy has reached the third line of defence, in surgery, it may seem rather late to speak of prevention. That, however, depends on what it is we hope and try to prevent. When a patient already has a tumour, we cannot, of course, prevent his being the subject of the tumour, but we may hope to prevent its development and fatal termination. Again, in the performance of the necessary operation in such a case, we have it in our power to prevent pain by the exhibition of an anaesthetic, to prevent dangerous loss of blood by efficient haemostasis, and to prevent bacterial infection by an aseptic technique. So, when we fail in keeping away the seeds of disease, we may still, perhaps, get at the root of the mischief, or nip it in the bud, and, if not even that, we may be able to prevent its wide spread or some of its most injurious effects.

### LEGISLATIVE PROPHYLAXIS.

As civilization becomes more extended and more complex, its attendant dangers are increased. The introduction of machinery of increasing power into more and more industries, the development constantly going on in the potency of the implements of war, and the perils inseparable from ever-increasing rapidity of locomotion render it more and more imperative that the risks to life should be correspondingly counteracted by growing ingenuity and care. Legislation attempts to deal in certain directions with the conditions which are thus brought about, and we have, under the Factory and other Acts, regulations for the fencing of machinery, for the prevention of explosions in mines, for reducing the risks of working in various poisonous substances, and arrangements for preventing total loss of wages to those who are